

Abstract Submitted  
for the DPP12 Meeting of  
The American Physical Society

**Frequency-Domain Interferometry of Electron Bunch Driven Wakefields** RAFAL ZGADZAJ, M.C. DOWNER, AUSTIN YI, GENNADY SHVETS, UT Austin, YUN FANG, USC, PATRIC MUGGLI, MPI, VITALY YAKIMENKO, MARCUS BABZIEN, MIKHAIL FEDURIN, KARL KUSCHE, BNL/ATF — Beam-driven plasma wakefield accelerators (PWFA), such as the “plasma afterburner” can potentially greatly increase the particle energies of conventional accelerators. Various schemes using single and multiple bunches of electrons, positrons and protons have been investigated. Appropriately delayed witness bunches have been the usual method to probe the fields of such wakes, and indirectly, the corresponding plasma wake structures. However, the wake structure has not been observed directly in the PWFA. We will report our progress in the development of direct, optical interferometric methods of measuring the plasma density modulation in electron beam driven wakefields. Frequency Domain Holography (FDH), employing two chirped laser pulses (probe and reference) co-propagating with the particle drive-beam and its plasma wake, permits single shot observation of an extended section of the wakefield behind a drive bunch. The chirped, temporally stretched, probe samples several periods of the wake, while the undisturbed reference pulse propagates ahead of the electron drive bunch. The technique is being developed in the Accelerator Test Facility at the Brookhaven National Laboratory as a probe for two and multibunch driven plasmawakefield experiments

Rafal Zgadzaaj  
UT Austin

Date submitted: 24 Jul 2012

Electronic form version 1.4